# WONDERS OF SOIL

THE LIVING SOIL

Soil & Water Stewardship 2004

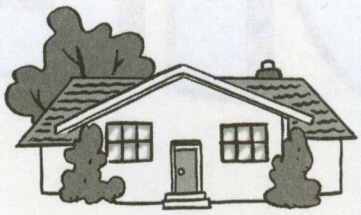
# SOIL STEPS

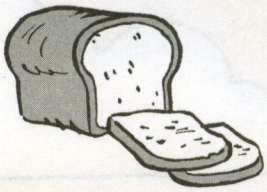
SOIL IS A WONDERFUL PLACE! ***PLANTS*** GROW IN SOIL. ***ANIMALS*** EAT PLANTS FROM THE SOIL. PEOPLE NEED PLANTS FROM SOIL AND ANIMALS FOR FOOD AND OTHER USES. SO ***MANY*** THINGS WE USE EVERYDAY START IN SOIL.

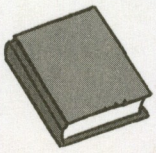
LOOK AT THESE FOODS AND OTHER ITEMS. ***ALL*** OF THEM START IN SOIL! USE THE WORDS IN THIS WORD BANK. WRITE EACH WORD IN A BLANK SPACE TO COMPLETE THE STEPS FROM SOIL TO FINISHED PRODUCT. ONE SET OF STEPS IS DONE FOR YOU!

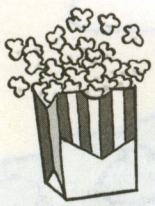
## WORD BANK

| | | |
|---|---|---|
| Apple | Grass | Paper |
| Apple Tree | Liquid Rubber | Pulp |
| Corn Plant | Log | Rubber Tree |
| Cow | Lumber | Tree (use twice) |
| Flour | Milk | Wheat |









To HOUSE

To BREAD

To

To

To BOOK

To

To

To

To ICE CREAM

To

To

To

To APPLESAUCE

To

To

To

To CAR TIRE

To

To

To FLOUR

To

To

To POPCORN

To

To WHEAT

To

To

From SOIL

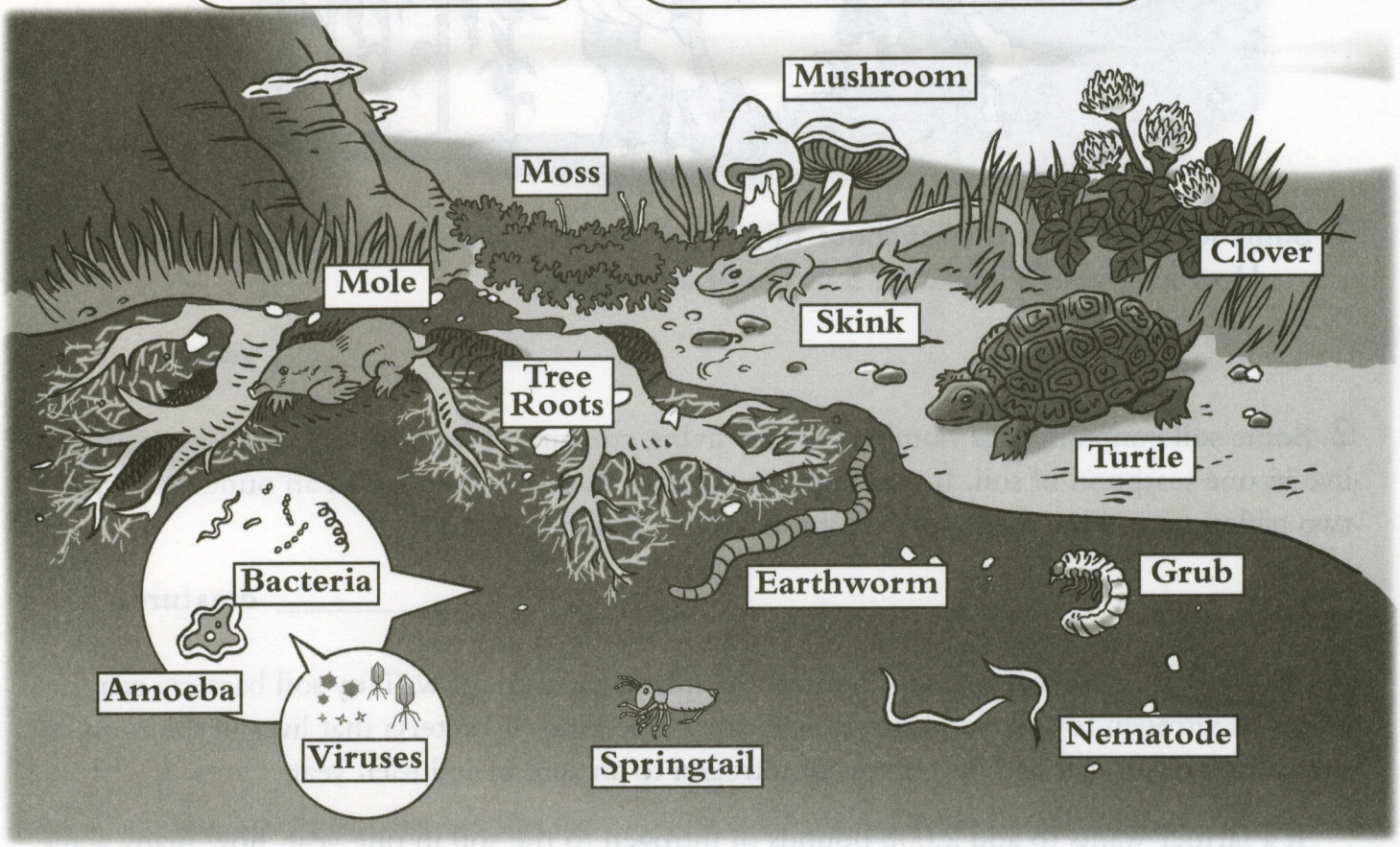
**Goal**

Readers identify steps in the growth, processing and production of common products that originate from materials grown in soil.

# SOIL SAFARI

SOIL HELPS MANY THINGS LIVE AND GROW. IN FACT, SOIL ITSELF CAN BE FULL OF LIFE! AN AMAZING VARIETY OF LIVING THINGS MAKE THEIR HOME IN AND AROUND SOIL.

THIS PICTURE SHOWS 14 KINDS OF LIFE IN SOIL. FIND EACH AND READ ITS NAME. THEN READ THE FUN FACTS BELOW THE PICTURE. WRITE THE NAME FOR EACH LIVING THING IN THE BLANK SPACE NEXT TO THE FUN FACT THAT DESCRIBES IT.




1. This small mammal tunnels under soil, where it eats insects and worms. _____
2. This soil animal has segments and bristles. Its tunnels and droppings make soil richer. _____
3. This reptile carries its home on its back. It hibernates under the soil in cold weather. _____
4. The most common type of lizard in the United States. Mothers care for their eggs, unlike most reptiles. _____
5. The young form of beetles. Some species feed on roots in the soil for 2 or 3 years. _____
6. A simple wingless insect. Its tail springs to help it jump into the air. _____
7. A small worm without segments. One of the most numerous animals one can see without a microscope. _____
8. A one-celled blob-like creature that moves by stretching and pulling itself. _____
9. Tiny creatures that live in colonies. One teaspoon of soil may hold more than a billion! _____
10. One of the smallest forms of life known, they may be 20 times smaller than bacteria. Usually found inside other living things. _____
11. These green plants enrich soil, give food to birds, and their pink, white or yellow flowers provide tasty honey! _____
12. Unlike green plants, this fungus can't make its own food. Some grow in rotting logs or leaves. _____
13. These simple green plants have no roots. Mats of them help keep minerals in soil from washing away. _____
14. One large woody plant may have several miles of these in soil. _____

**Goal**
Readers observe illustrations of soil organisms, read descriptions of them, then write the name of each organism next to its description.

# Soil Solutions


**1**. Some scientists think it takes about 1,000 years for 1/2 inch of soil to form in nature. How long would it take for 5 inches of soil to form?

_____ **years**

**2**. Some soil contains huge numbers of tiny living creatures. Five billion tiny creatures can live in one teaspoon of soil. If a tablespoon contains three teaspoons, and an ounce contains two tablespoons, how many tiny creatures live in an ounce of soil?

_____ **creatures**

**3**. Nitrogen is an important soil chemical that plants need to grow. Tiny soil bacteria can help add nitrogen to soil, so plants grow better. One kind of bacteria that lives in the roots of some bean plants can add 40 pounds of nitrogen to an acre of soil each year.

If a farmer wants to add 2,000 pounds of nitrogen to the soil in one year, how many acres should he plant with bean plants?

_____ **acres**

**4**. Good soil can be washed away by rain. Plant roots help keep soil in place. During heavy rain, 1,000 times more soil is lost from bare land than from land that is covered with plants.

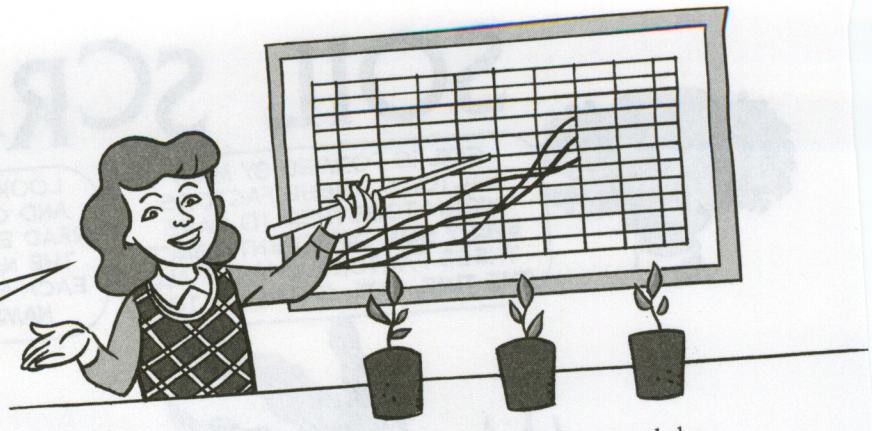
A heavy rainstorm washed 60 pounds of soil from an acre of forest into a stream. Across the stream, an acre of soil was left bare during building of a new home. How much soil was lost from the bare acre during the rainstorm?

_____ **pounds of soil**

**Goal**
Readers review sentences that describe soil-related concepts and facts, then solve math problems based on the information presented.

**Answers**
1. 10,000 years 2. 30 billion creatures
3. 50 acres 4. 60,000 pounds of soil

# GROWTH GRAPH



SOIL GIVES A HOME FOR PLANTS TO GROW. IT ALSO GIVES THEM MINERALS. SOME SOILS HELP PLANTS GROW BETTER THAN OTHERS. THIS ACTIVITY WILL HELP YOU COMPARE HOW PLANTS GROW IN THREE DIFFERENT TYPES OF SOIL AND GRAPH YOUR RESULTS.

Get three **pots** or **paper cups**. Collect three different **soil samples**. Try to choose soil from three very different areas. Place the soil in separate pots or cups. Write the name of the place you collected the soil on each container. Write the place you gathered each sample on the **Key** to your graph.

Look at the soil samples. Which one do you predict will help plants grow best?

Place several **seeds** in each container. Use **radish**, **lettuce** or **alfalfa** seeds. They sprout quickly. Cover the seeds lightly with soil. Water the seeds.

Each day, lightly water each container. When the first plant sprouts, measure their height and mark their growth on the graph at **Day 1**.

For the next ten days, observe, measure and record the height of the highest plant in each container on the graph. Use different color pencils or markers for each container, as shown in your **Key**.

At the end of 10 days, connect the marks on the graph for each soil sample. For example, connect all the red dots with a red line. Look at your graph and then review your results. Think about these questions:

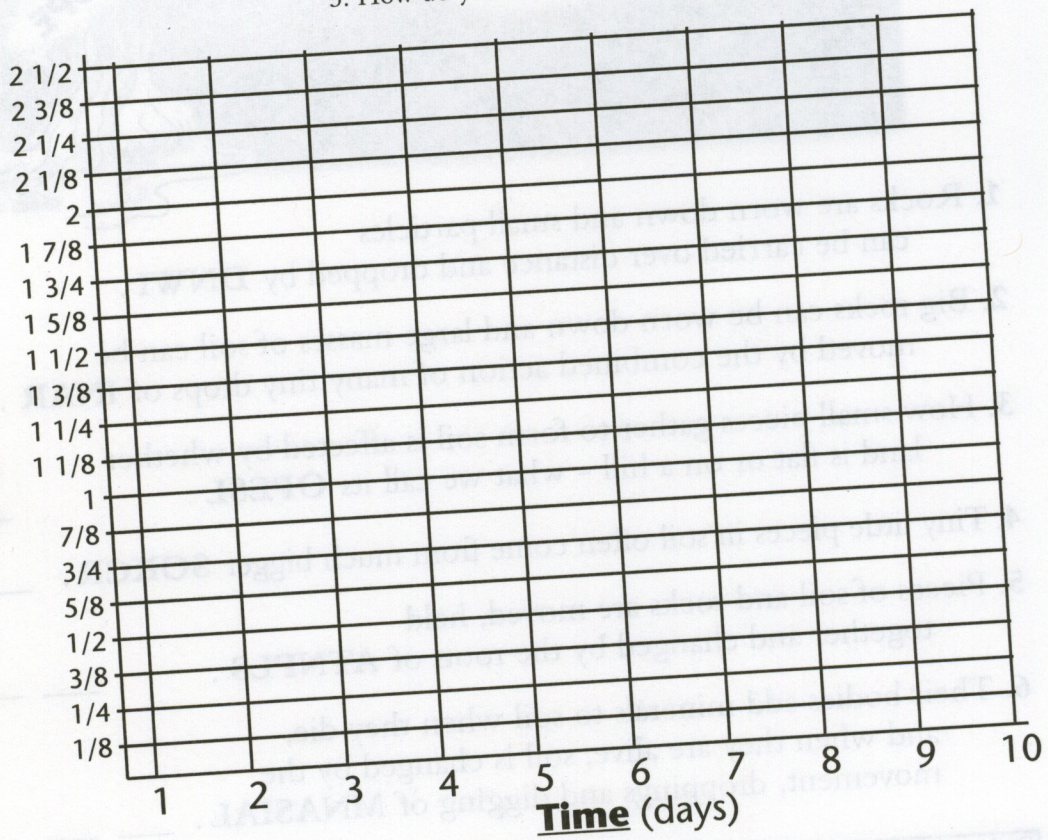
1. In which soil sample did seeds sprout first?
2. In which soil sample did seeds grow highest?
3. What was the difference in the ending height of plants in the best and worst soils?
4. Why do you think the best soil grew plants better than the others?
5. How do your results compare with your predictions?

**KEY**

**BLUE - Sample 1**
Collected from:

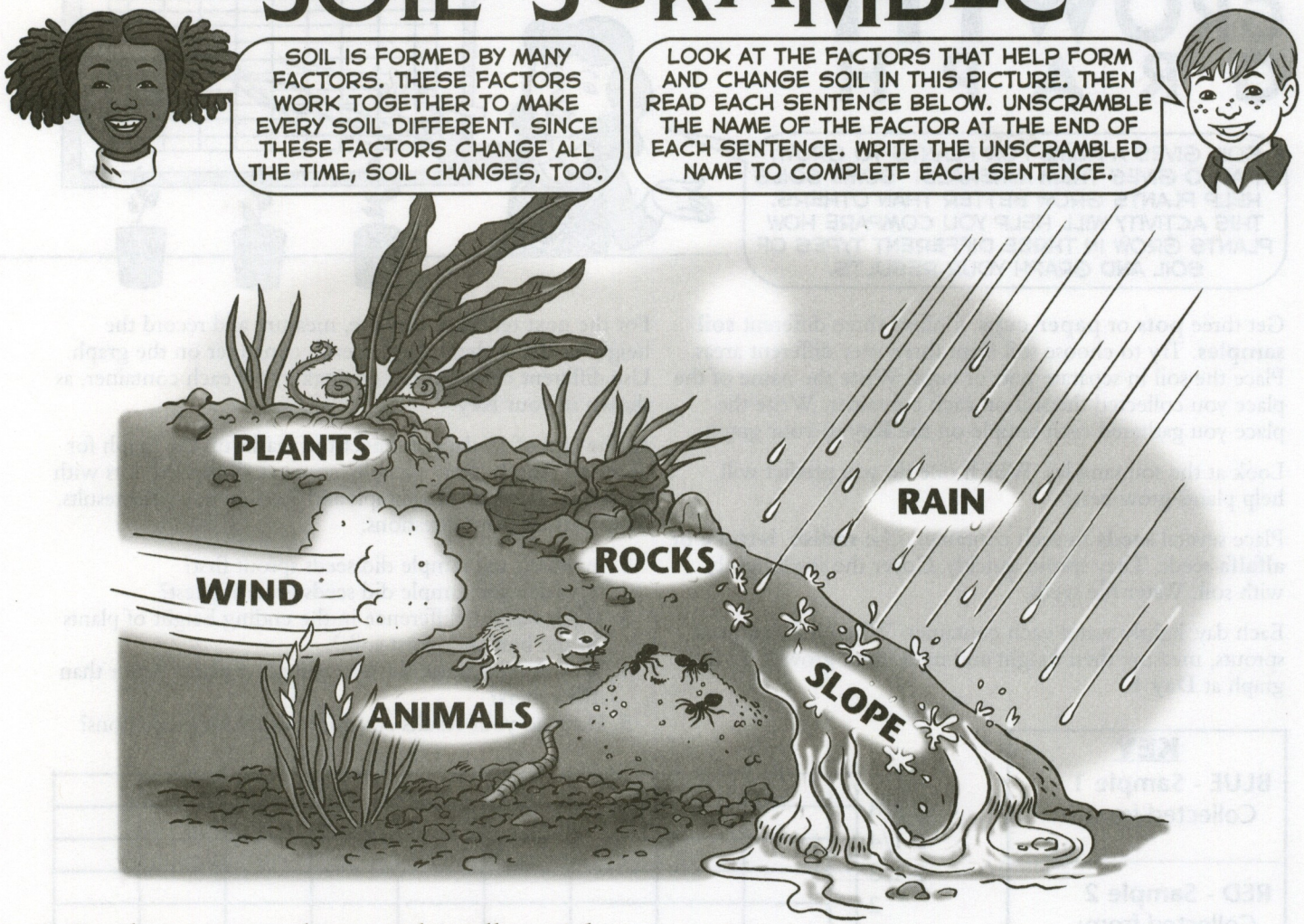
**RED - Sample 2**
Collected from:

**GREEN - Sample 3**
Collected from:




**Goal**
Readers collect three soil samples, plant seeds, observe and record plant growth, graph plant growth, then observe and analyze their results.

# SOIL SCRAMBLE




1. Rocks are worn down and small particles can be carried over distance and dropped by **DNWI** . ____ ____ ____ ____

2. Big rocks can be worn down and large masses of soil can be moved by the combined action of many tiny drops of **INAR** . ____ ____ ____ ____

3. How small pieces gather to form soil is affected by whether land is flat or on a hill - what we call its **OPESL** . ____ ____ ____ ____ ____

4. Tiny little pieces in soil often come from much bigger **SOKCR** . ____ ____ ____ ____ ____

5. Pieces of soil and rocks are moved, held together and changed by the roots of **ATNPLS** . ____ ____ ____ ____ ____ ____

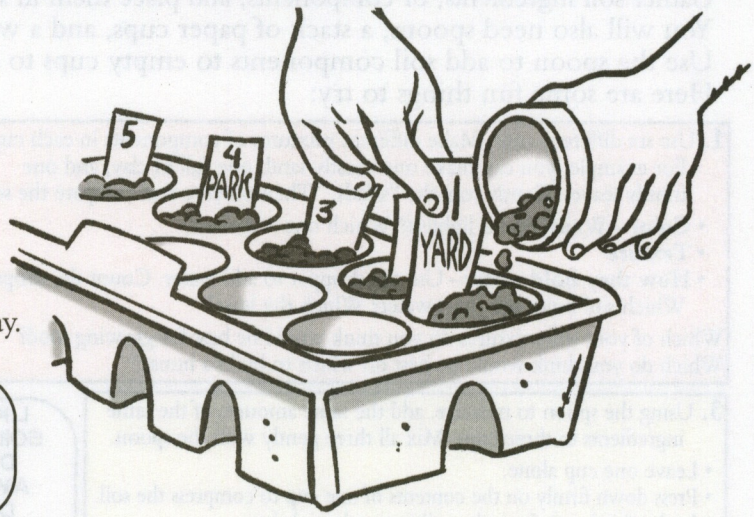
6. Their bodies add minerals to soil when they die, and when they are alive, soil is changed by the movement, droppings and digging of **MNASIAL** . ____ ____ ____ ____ ____ ____ ____

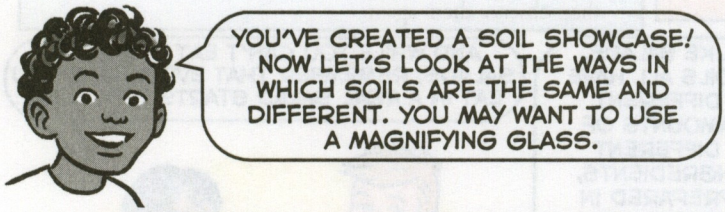
**Goal**
Readers unscramble words that describe factors that help form and change soil, then write the words to complete sentences that describe each factor.

# SOIL SHOWCASE


Get an **empty egg carton**.
Make six **labels** from strips of paper.
Write the numbers **1** to **6** on them.

Gather soil samples from six different places.
Note the location from which the soil is taken.
For each sample, write the place you gathered the soil on one of your labels.
Put the label in an empty space in the egg carton.
Then add that soil to the space, filling it about halfway.




1. **Color** - Different chemicals in soil help give it color. List your soil samples in order, from lightest to darkest.

   ___ ___ ___ ___ ___ ___

2. **Texture** - Different soils are made of different sized **particles**. Some soils have mostly the same kind of particles. Some have a variety.

   Which sample has the biggest particles? ___
   Which sample has the smallest particles? ___
   Which has the greatest variety of particles? ___

3. **Structure** - Pieces of soil clump together differently. Pinch the soils between your thumb and a finger.

   Which sample clumped together **most**? ___
   Which sample clumped together **least**? ___

4. **Organic Matter** - Different soils contain different pieces of plants and animals. Can you recognize pieces of plants and animals in any of your samples?

5. **How It Holds Water** - Different soils absorb water differently. Some soils allow water to soak in. Water runs off the top of some soil. Some soils hold water, while water passes right through others.

   Transfer a small amount of each sample to the empty space in front of it. With an eyedropper, add a drop of water to each sample. Watch how the water soaks into the soil. Add several more drops and watch how it affects the soil.

   Which sample do you think would **best** hold water? ___
   Which sample do you think would be **least** able to hold water? ___


**Goal**
Readers gather soil samples, label them, then observe and describe differences in appearance, texture, structure, content and water retention.

# Soil Salad


**Sand**
**Fine gravel**
**Clay**
**Organic matter,** like
**Crumpled leaves**
**Sawdust**
**Peat Moss**

This fun activity shows you how the mixture of soil ingredients affects soil!
Gather soil ingredients, or components, and place them in separate bowls. These can include:
You will also need spoons, a stack of paper cups, and a water dropper.
Use the spoon to add soil components to empty cups to create different soil "salads."
Here are some fun things to try:

**1.** Use six different cups. Make different mixtures of components in each cup. For example, you can make one mostly sand, one full of clay, and one mostly leaves. Gently mix the "salads." Then observe and compare the soils.

- **Color** - Which one is lightest? Which one is darkest?
- **Texture**
- **How they hold water** - Use the dropper to add water. Count the drops. Which soil holds the most water? Which the least?

Which of your soil mixtures do you think would be best for growing food?
Which do you think would be best on which to build a house?

**2.** Using the spoon to measure, add the same amounts of the same ingredients to three cups.

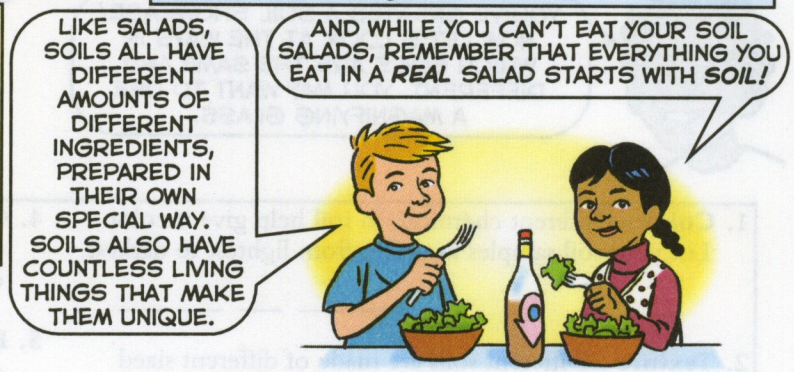
- Leave one cup alone.
- Gently bounce one cup up and down to mix the ingredients.
- Cover the third cup with your hand and shake it vigorously. Then observe and compare the soils.

How did movement affect the soils' structure and texture?
Can you think of forces in nature that affect how soils mix?
Add ten drops of water to each cup, repeat the different actions, then observe them again.

**3.** Using the spoon to measure, add the same amounts of the same ingredients to three cups. Mix all three gently with the spoon.

- Leave one cup alone.
- Press down firmly on the contents of one cup to compress the soil.
- In the third cup, form the soil into a slanted slope.

Drop water droplets on each sample and observe how the drops act.
How does the compressed soil structure affect how water is absorbed?
How does the slope of soil affect water absorption?
Did the action of the water droplets change the soil?




**Goal**
Readers mix individual soil components and observe the effect of composition and structure on soil color, texture and ability to hold water.

Available from your local conservation district, state natural resources agency and the

**National Association of Conservation Districts**
408 East Main P.O. Box 855 League City, TX 77574-0855
1-800-825-5547, ext. 32 www.nacdnet.org

**NOTE TO EDUCATORS:** Each activity was developed with an educational goal in mind that should be adapted to the needs of the grade level you are teaching. Also, each activity is correlated to environmental education standards established by the North American Association of Environmental Education, as outlined in the book **Excellence in EE – Guidelines for Learning** (K-12). Each guideline includes references to national education standards that form the basis for the state standards you follow.

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